

THE CALIFORNIA SPECIES OF *PHILORUS*:  
TAXONOMY, EARLY STAGES AND DESCRIPTIONS  
OF TWO NEW SPECIES (DIPTERA: BLEPHAROCERIDAE)

By CHARLES L. HOGUE<sup>1</sup>

**ABSTRACT:** The genus *Phylorus* is known in North America only from California. There are four species: *yosemite* Osten Sacken, 1877, *jacinto* n. sp., *vanduzeei* Alexander, 1966 and *californicus* n. sp. The early stages of the first and last are known and described here for the first time with the adults of all the species. An unidentified larva from Modoc County is also known and described. It possibly represents a fifth species.

The name *ancilla* Osten Sacken, 1878 is synonymized with *yosemite* and a lectotype is designated for the species.

The description below of two new species of *Phylorus* raises the number in this genus to four for California, as well as for North America and the Western Hemisphere. With a complex of mountainous terrain in western North America equally as diverse geologically and ecologically as that of Japan, the center of abundance of *Phylorus* in the Old World (10 species), the number should go considerably higher. To discover yet unknown forms, I urge intensified collecting especially in the Rocky Mountains and the Pacific Northwest at large.

I wish to thank C. P. Alexander, Amherst, Massachusetts, for his assistance and advice and for providing material [ALEX]. For the loan of specimens, I am also indebted to the following individuals and their respective institutions: P. H. Arnaud, California Academy of Sciences [CAS], J. L. Bath, University of California, Riverside [UCR], P. J. Darlington, Museum of Comparative Zoology, Harvard University [MCZ], J. G. Edwards, California State College, San Jose [SJS], L. L. Pechuman, Cornell University [CU], J. A. Powell, California Insect Survey, University of California, Berkeley [CIS], A. Stone, A.R.S., U.S. Department of Agriculture—U.S. National Museum [USNM] and P. Wygodzinsky, American Museum of Natural History [AMNH]. [LACM] indicates material in the Los Angeles County Museum of Natural History.

Paul Freeman, British Museum (Natural History), made possible the synonymy of *ancilla* with *yosemite* by locating and examining the types of the former.

*Phylorus yosemite*

Figures 1-2, 7-13

*Blepharocera yosemite* Osten Sacken, 1877. Bull. U.S. Geol. Survey Terr. 3:194-196. Type: LECTOTYPE, ADULT ♂, BY PRESENT DESIGNATION: labelled as follows: "Type 12530/Yosemite, Cal. June 6. O Sack/*Blepharocera yosemite* O.S./ ♂ genitalia on slide number CLH 631014-1/Lec-

<sup>1</sup>Curator of Entomology, Los Angeles County Museum of Natural History.

totype *Blepharocera yosemite* O.S. C.L. Hogue 1966" [MCZ]. Selected as single extant specimen of original cotype series of 3 males, all with same data.

*Blepharocera ancilla* Osten Sacken, 1878. Cat. Des. Dip. N. Amer., Smith. Misc. Coll. 16:266-267. NEW SYNONYMY.

*Liponeura yosemite*, combination of Osten Sacken, 1878. Deutsche Entomologische Zeitschrift 28:408-410.

*Philorus yosemite*, combination of Kellogg, 1903. Proc. Calif. Acad. Sci., Ser. 3 3:199.

#### *Adult Female*

*Size.* Medium; measurements (lengths in mm from typical specimen): overall body 9; wing 9.9; fore femur 5.9, tibia 4.5, basitarsus 2.0; mid femur 5.7, tibia 4.5, basitarsus 1.3; hind femur 6.9, tibia 6.1, basitarsus 1.9.

*Head.* Eyes approximate above antennal bases, interocular distance less than ocellus diameter; bisected, upper portions slightly more extensive than lower and with larger ommatidia. Antenna short, shape and size of flagellar segments about equal, as figured, except basal which is slightly more than 2.0 length of others, ultimate and penultimate segments subequal, former slightly longer than the latter. Mouthparts with all normal elements, mandibles present; maxillary palpus with segments 2 and 3 subequal, 4 and 5 subequal.

*Thorax.* Scutellum with patches of bristles restricted to lateral corners; posterior pronotum (strongly convex sclerite immediately cephalodorsad of mesothoracic spiracle) nude. Legs with tibial spurs 0-2-2; mid tibia approximately 3.5 basitarsus. Wing shape, venation and macrotrichia as figured,  $R_5$  branching off from  $R_4$  at near or greater than a  $45^\circ$  angle,  $M_3$  frequently with small barb or irregular pigment blotch projecting cephalad in basal third, 1A sometimes not reaching wing margin; membrane entirely hyaline.

*Genitalia.* As figured (Fig. 13).

#### *Adult Male*

*Size.* Medium, smaller than female; measurements (lengths in mm from lectotype—apparently a small individual, most specimens are somewhat larger): overall body 8; wing 8.4; fore femur 4.3, tibia 3.9, basitarsus 1.95; mid femur 4.6, tibia 3.9, basitarsus 1.5; hind femur 5.9, tibia 5.5, basitarsus 1.7.

*Head.* Eyes well separated above antennal bases, interocular distance about equal to (or slightly less than) width of ocellar tubercle; bisected, upper portions smaller than lower (estimated one-third the total surface area), with slightly larger ommatidia. Antenna as in female. Mouthparts with mandibles absent; tip of labrum bare; tip of hypopharynx bare, evenly rounded, marginal teeth present; maxillary palpus segments 2 and 3 subequal, 5 approximately 2.0 length of 4.

*Thorax.* Scutellum and posterior pronotum as in female. Legs with tibial spurs 0-1-2, single spur of middle tibia very tiny; mid tibia approximately 2.7 basitarsus. Wing as figured, shape, etc. as in female, irregularities of  $M_3$  and 1A as described for female (except 1A not reaching wing margin in several

specimens from San Gabriel Canyon material); membrane hyaline apically, basal half (or slightly more) infuscated.

*Genitalia.* As figured (Fig. 12). Tip of paramere attenuo-uncinate, sub-apical one-third of shaft with dense dorsolateral area of spinules distad, heavier teeth proximad.

#### *Pupa*

*Size.* Medium; measurements (lengths in mm): 5.5-8.6; mean (n=25): 7.0.

*Structure.* As figured (Figs. 8-9).

*Color* (in alcohol). General dorsal surface dark grey-brown or grey-black, lighter on abdomen, intense to near black in vicinity of respiratory processes. Lamellae of respiratory processes translucent, grey-brown.

#### *Larva—Final Instar*

*Size.* Medium to large; measurements (lengths in mm): range: 4.5-12.3; mean (n=25): 7.9.

*Structure.* As figured (Fig. 7); see also Table 1.

*Color* (in alcohol). Dorsal integument dark grey-brown to black; area surrounding anterior pair of dorsal tubercles on median division III creamy-yellow in some specimens, especially in Kern Canyon material where this color is extensive and extends cephalad onto the neighboring segment, and caudad to encompass the posterior pair of dorsal tubercles; head black; other sclerotic portions brown.

#### *Material*

*Colusa Co.* 3 pupae: Paradise Creek, el. 2400', July 24, 1953 (H. P. Chandler) [CAS]

*Mariposa Co.* 1 ♂: Upper Yosemite Falls, Yosemite Valley, June 6, 1876 (C. R. Osten Sacken) [MCZ-LECTOTYPE]

2 larvae: Middle Fork Chowchilla River, bridge east of Bootjack, April 13, 1960 (R. C. Jorgensen) [SJS]

*Fresno Co.* 1 ♂: Toll House along Dry Creek, June 10, 1963 (C. P. Alexander) [ALEX]

1 ♂: small stream west General Grant Grove, Route 180, el. 4900', Sequoia Nat'l. Park, June 7, 1963 (C. P. Alexander) [ALEX]

1 ♂, 2 ♀: waterfall at 3500', Kings Canyon Road, May 31, 1963 (C. P. Alexander) [ALEX, LACM]

5 ♂: waterfall at 3500', Horseshoe Bend, Route 180, Sequoia Nat'l. Park, June 1, 1963 (C. P. Alexander) [ALEX, LACM]

8 pupal skins: west cliff along Route 180, Kings Canyon Nat'l. Park, June 21, 1963 (C. P. Alexander) [ALEX]

5 ♂, 1 ♀: waterfall at 3500', Big Creek near Huntington Lake, June 9, 1963 (C. P. Alexander) [ALEX, LACM]

*Kern Co.* 21 larvae, 13 pupae: tributary to Kern River, east side Kern Canyon, April 6, 1963 (C. L. Hogue, Coll. No. CLH 79) [LACM]

TABLE 1  
Diagnosis of third and fourth instar larvae of California *Phyllosus*

|                         | Number of<br>gill filaments | Number of<br>antennal segments | Head capsule<br>excisions<br>(lft. med. rt.) | Head capsule<br>flanges    |
|-------------------------|-----------------------------|--------------------------------|----------------------------------------------|----------------------------|
| <i>yosemite</i>         |                             |                                |                                              |                            |
| III                     | 3                           | 2                              | + + +<br>(deep,<br>narrow)                   | +                          |
| IV                      | 5                           | 3                              | + - +                                        | Weakly developed<br>median |
| <i>californicus</i>     |                             |                                |                                              |                            |
| III                     | 0                           | 2                              | + - +                                        | -                          |
| IV                      | 3                           | 3                              | + - +                                        | -                          |
| Modoc County<br>species |                             |                                |                                              |                            |
| III                     | 3                           | 2                              | + + +                                        | +                          |
| IV                      | 5                           | 2                              | - - -                                        | -                          |



Los Angeles Co. 22 ♂, 16 ♀, 48 larvae, 64 pupae and pupal skins; Big Tujunga Canyon, San Gabriel Mountains, April 22-May 27, 1962 (D. Gibo) [LACM]

2 larvae: Ladybug Canyon, el. 4000', San Gabriel Mountains, April 24, 1963 (C. L. Hogue) [LACM]

#### Remarks

The type material and consequent identity of *ancilla* have been obscure for a long time although it has been suspected that the name applied merely to the female of *yosemite* (Walley, 1927:115; Alexander, 1963, personal communication). With the cooperation of J. E. Collin, Newmarket, England, P. Freeman, British Museum (Natural History) located two female specimens of *ancilla* labeled as types by Osten Sacken. At my request he compared them against the characters of the other California species and found them to agree with *yosemite*. I was able to verify this during a visit to the Museum in 1964.

Notes on the biology of this species in Los Angeles County are given by Gibo (1964).

### ***Phylorus jacinto*, new species**

Figures 14-15

#### *Adult Female*

*Size.* Medium; measurements (lengths in mm from allotype): overall body 10; wing 11.5; fore femur 6.2, tibia 4.9, basitarsus 2.2; mid femur 6.2, tibia 4.9, basitarsus 1.3; hind femur 7.9, tibia 6.9, basitarsus 2.2.

*Head.* Eyes approximate above antennal bases, interocular distance less than ocellus diameter; bisected, upper portions slightly more extensive than lower and with larger ommatidia. Antenna short, shape and size of flagellar segments about equal, except basal which is slightly more than 2.0 length of others, ultimate and penultimate segments subequal, former slightly longer than latter. Mouthparts with all normal elements, mandibles present; maxillary palpus segments 3-4 subequal, 4-5 subequal, 5 very slightly shorter than 4.

*Thorax.* Scutellum with dense patches of bristles restricted to lateral corners; posterior pronotum nude. Legs with tibial spurs 0-2-2; mid tibia approximately 3.8 length of basitarsus. Wing shape and venation as figured for *yosemite* (Fig. 1), except for barb on  $M_3$ ,  $R_5$  branching off from  $R_4$  at near or greater than a 45° angle; membrane entirely hyaline.

*Genitalia.* As figured (Fig. 15).

#### *Adult Male*

*Size.* Medium, smaller than female; measurements (lengths in mm from holotype): overall body 7.0; wing 9.0; fore femur 5.2, tibia 4.7, basitarsus 2.3; mid femur 5.4, tibia 4.5, basitarsus 1.7; hind femur 6.9, tibia 6.3, basitarsus 2.2.

*Head.* Eyes well separated above antennal bases, interocular distance slightly less than width of ocellar tubercle; bisected, upper portions smaller than lower (estimated one-fourth the total surface area), with slightly larger omma-

tidia. Antenna as in female. Mouthparts with mandibles absent; tip of labrum bare; tip of hypopharynx bare, evenly rounded, marginal teeth present; maxillary palpus segments 2-5 subequal.

*Thorax.* Scutellum and posterior pronotum as in female. Legs with tibial spurs 0-2-2; mid tibia approximately 2.6 basitarsus. Wing shape etc. as in female; membrane entirely hyaline.

*Genitalia.* As figured (Fig. 14). Tip of paramere straight-attenuate, subapical one-fourth of shaft serrately toothed dorso-laterad.

#### *Early Stages*

Unknown.

#### *Material*

*Holotype* ♂ (genitalia on slide No. CLH 650823-2): *Riverside Co.* Strawberry Creek. el. 3000', San Jacinto Mountains, June 29, 1965 (P. A. Rauch) [UCR, in alcohol]

*Allotype* ♀ (genitalia on slide No. CLH 650823-3): same data as holotype.

*Paratypes* 3 ♂, 3 ♀: same data as holotype [UCR, LACM]

#### *Philorus vanduzeei*

Figures 5-6, 16-20

*Philorus vanduzeei* Alexander, 1966. Bull. Brook. Ent. Soc., 58: 134-135.

#### *Adult Female*

*Size.* Medium; measurements (lengths in mm from allotype, unless otherwise noted): overall body (not determinable); wing 8.9; fore femur 6.5, tibia 4.9, basitarsus 3.0; mid leg (not allotype), femur 6.2, tibia 5.0, basitarsus 1.8; hind femur 7.7, tibia 6.8, basitarsus 3.4.

*Head.* Eyes approximate above antennal bases, interocular distance less than ocellus diameter; bisected, upper portions slightly more extensive than lower, with larger ommatidia. Antenna short, shape and size of flagellar segments about equal, as figured, except basal which is about 2.5 length of others, ultimate and penultimate segments subequal. Mouthparts with all normal elements, mandibles present; maxillary palpus segment 3 slightly longer than 2, segment 5 approximately 1.7 times length of 4.

*Thorax.* Scutellum with patches of bristles restricted to lateral corners; posterior pronotum nude. Legs with tibial spurs 0-2-2; basitarsi all exceptionally long, mid tibia approximately only 2.8 length of basitarsus. Wing shape, venation and macrotrichia as figured,  $R_4$  and  $R_5$  forming a symmetrical fork from petiole ( $R_{4+5}$ ); membrane entirely hyaline.

*Genitalia.* As figured (Fig. 20).

#### *Adult Male*

*Size.* Smaller than female; measurements (lengths in mm from holotype

unless otherwise noted): overall body (not determinable); wing 9.0; fore femur 6.5, tibia 6.7, basitarsus 4.5; mid leg (not holotype), femur 6.2, tibia 5.8, basitarsus 3.2; hind femur 8.1, tibia 8.0, basitarsus 4.2.

*Head.* Eyes well separated above antennal bases, interocular distance about equal to width of ocellar tubercle; bisected, upper portions much smaller than lower (estimated one-fifth the total surface area), with slightly larger ommatidia. Antenna as in female. Mouthparts with mandibles absent; extreme tip of labrum bare, subapical lateral margins with spiculate denticles; tip of hypopharynx bare, marginal teeth present but weak; maxillary palpus segments 2-5 subequal.

*Thorax.* Scutellum and posterior pronotum as in female. Legs with tibial spurs 0-0-2; basitarsi very long as in female, mid tibia only about 1.8 length of basitarsus. Wing shape etc. as in female; membrane entirely hyaline.

*Genitalia.* (Known only from incomplete holotype.) As figured for dististyle (Fig. 18) and IX tergite lobes (Fig. 19); shape of basal process of dististyle not determinable; tegmen oblong, apex rounded; tip of paramere broadly uncinat, distal half of shaft with sparse, slender spines (similar to *yosemite* but fewer in number).

#### *Early Stages*

Unknown.

#### *Material*

*San Diego Co.* 1 ♂, 1 ♀: Alpine, April 9, 1915 (M. C. Van Duzee) [ALEX-holotype and allotype]

1 ♂, 1 ♀: same data as above, from same series but unknown at the time of original description. [CU]

#### *Remarks*

Unfortunately *vanduzeei* is known only from four imperfect specimens. Collecting in the Laguna Mountains in southern California should produce additional material. The species is known only from the type locality presently but probably will be found in the neighboring Santa Ana Mountains and possibly in other ranges to the north and south in Baja California, Mexico.

### ***Philorus californicus*, new species**

Figures 3-4, 21-27

(?) *Philorus yosemite*, identification of Kellogg, 1903. *Psyche* 10: 186-187.

(?) *Bibiocephala* sp. identification of Peterson, 1951. *Larvae of insects*, Pt. II, p. 274, Fig. D6-H-I.

#### *Adult Female*

*Size.* Medium, generally smaller and less robust than the other species; measurements (lengths in mm from typical specimen): overall body 8; wing

8.9; fore femur 5.3, tibia 4.9, basitarsus 2.6; mid femur 5.2, tibia 4.7, basitarsus 1.9; hind femur 7.2, tibia 6.7, basitarsus 2.5.

*Head.* Eyes approximate above antennal bases, interocular distance less than ocellus diameter; bisected, upper portions slightly more extensive than lower, with larger ommatidia. Antenna short, shape and size of flagellar segments approximately equal, as figured, except basal which is about 2.5 length of others, ultimate segment 1.5 length of penultimate. Mouthparts with all normal elements, mandibles present; maxillary palpus segment 3 approximately 1.4 length of 2, segment 5 approximately 2.7 length of 4.

*Thorax.* Lateral corners of scutellum with dense patches of bristles, patches thinning mesad and connecting across posterior margin; posterior pronotum with a few bristles. Legs with tibial spurs 0-2-2; mid tibia approximately 2.5 length of basitarsus. Wing shape, venation and macrotrichia as figured,  $R_4$  and  $R_5$  forming a symmetrical fork from petiole ( $R_{4+5}$ ); membrane entirely hyaline.

*Genitalia.* As figured (Fig. 27).

#### *Adult Male*

*Size.* Smaller than female; measurements (lengths in mm from typical specimen): overall body 4.5; wing 6.7; fore femur 4.1, tibia 4.2, basitarsus 2.2; mid femur 4.2, tibia 3.8, basitarsus 1.8; hind femur 5.5, tibia 5.2, basitarsus 2.2.

*Head.* Eyes well separated above antennal bases, interocular distance nearly one-half width of ocellar tubercle; bisected, upper portions smaller than lower (estimated one-fourth the total surface area), with slightly larger ommatidia. Antenna as in female. Mouthparts with mandibles absent; tip of labrum densely spiculate; tip of hypopharynx with elongate spicules, attenuate, marginal teeth present; maxillary palpus segments 2 and 3 subequal, 5 approximately 3.0 length of 4 (sometimes less).

*Thorax.* Scutellum and posterior pronotum as in female. Legs with tibial spurs 0-0-2, mid tibia approximately 2.1 basitarsus. Wing as figured, as in female; membrane entirely hyaline.

*Genitalia.* As figured (Fig. 26). Tip of paramere ensiform, shaft without spines; dorsal bristles of basistyle usually numerous (as figured), sometimes reduced to 1 or 2.

#### *Pupa*

*Size.* Medium, smaller than all above species; measurements (lengths in mm): range: 5.0-7.0; mean ( $n=25$ ): 5.9.

*Structure.* As figured (Figs. 22-23).

*Color* (in alcohol). General dorsal surface evenly medium brown; lamellae of respiratory processes translucent, pale grey.

#### *Larva—Final Instar*

*Size.* Medium to large; measurements (lengths in mm): range 3.5-10.1; mean ( $n=25$ ): 6.9.

*Structure.* As figured (Fig. 21); see also Table 1.

*Color* (in alcohol). Dorsal integument light brown; head and other sclerotic portions dark brown.

#### *Material*

*Holotype* ♂: *Madera Co.* Mugler Meadow, July 31, 1946 [CAS]

*Allotype* ♀: *Sierra Co.* Sierra City, Aug. 10-14, 1963, disturbed from large rock by stream—Yuba River, shady, netted in flight (R. Westcott) [LACM]

*Paratypes:* *Siskiyou Co.* 1 ♂ (partly dissected from pupal case): 10 mi. SW Shasta City, S. Fork Sacramento River, July 21, 1948 (W. Wirth) [USNM]

2 ♀: S. Fork Sacramento River, el. 4000', Aug. 4, 1953 (H. P. Chandler) [CAS]

*Sierra Co.* 5 ♂ (one specimen totally dissected and mounted on slides, Nos. CLH 631114-3a-d): Same data as allotype. [LACM]

*Madera Co.* 1 ♂: Same data as holotype, genitalia on slide No. CLH 631204-5 [CAS]

*Mariposa Co.* 1 ♀: Yosemite, July 2, 1947 (A. L. Melander) [USNM]

*Other.* *Siskiyou Co.* 2 ♂, 3 ♀, 66 larvae, 60 pupae (adults dissected from pupal skins, partly or wholly, mounted on slides): 10 mi. SW Shasta City, July 21-22, 1948 (W. Wirth) [USNM, CIS]

*Humboldt Co.* 11 larvae: 6 mi. W. Dinsmore, June 18, 1950 (L. W. Quate) [CIS]

9 larvae, 1 pupa: Willow Creek, August 12, 1948 (W. Wirth) [USNM]

*Sierra Co.* 102 larvae, 83 pupae: Sierra City, June 16, 1940 (T. Aitken & M. Crazier) [AMNH]

*El Dorado Co.* 3 larvae: Riverton, June 27, 1950 (Ting & Quate) [CIS]

*Mono Co.* 18 larvae: Sardine Creek, el. 8500', June 28, 1951 (Silver) [LACM]

*Inyo Co.* 39 pupae: Whitney Portals, August 31, 1951; on rocks under waterfall (Coleman) [USNM]

*Fresno Co.* 2 larvae, 3 pupae: Granite Creek, Kings River Canyon, July 13, 1930 (V. L. Kellogg) [USNM]

*Tulare Co.* 3 larvae: Giant Forest-Marble Fork, Sequoia Nat'l. Forest, Kings River Trail, el. 6500-7100'; July 24, 1907 (J. C. Bradley; Johannsen Lot 2275) [CU]

#### *Remarks*

It appears that Kellogg's "re-discovery" (1903) of *yosemite* in Kings Canyon (Granite Creek) was actually the discovery of *californicus* (Hogue, footnote p. 44 in Gibo, 1964), however, it is not possible to say this with certainty, from Kellogg's description or material. The specimens he collected are not available although I have examined a larva and pupa which are definitely *californicus* collected by Kellogg in Granite Creek, July 13, 1930. References in his paper to the contiguous respiratory flaps—although this also applies to *yosemite* (but in strict regard to the posterior flap only, not the whole gill struc-



ture as in *californicus*)—and similarity of the lateral processes of *Agathon* (as *Bibiocephala*) *comstocki* which is more like *californicus* than *yosemite*, also lead me to suspect that he found *californicus*. The question must remain unanswered until, if ever, his material is found.

The larva figured and described by Peterson (1951:274, Fig. D6-H-I) is certainly a *Philorus* very closely related to *P. californicus*. It is even likely that it is that species.

The number of gill filaments in the mature larva of *californicus* (3) is less than previously cited as minimum (5) for fourth instar *Philorus* larvae by Kitakami (1941:56), Stukenberg (1958:124) and Alexander (1963:41).

The structure of the pupal gills is similar to that of *Philorus alpinus*, a Japanese species (figured by Kitakami, 1931: Fig. 52) and pupa "Q" (*Philorus* sp.), an Indian species (figured by Tonnoir, 1930: Fig. 39).

## UNIDENTIFIED LARVA FROM MODOC COUNTY<sup>2</sup>

### Figures 28-29

From two localities in the Warner Mountains of Modoc County, I have larvae representing an unidentifiable species, there being no way of correlating them with adults. Their structure is basically similar to that of *yosemite*, the most conspicuous difference being the much greater development of the dorsal and dorsolateral tubercles. Other differences are summarized in the diagnosis and in Table 1.

#### Larva—Final Instar

*Size.* Medium; measurements (lengths in mm): range 4.2-8.2.

*Structure.* As figured (Fig. 28-29); also see Table 1.

*Color* (in alcohol). Dorsal integument light brown; head and other sclerotic portions dark brown.

#### Material

Modoc Co. Cedar Pass, May 15, 1948 (W. Wirth) [USNM]

Willow Creek, Fandango Pass Road, May 15, 1948 (W. Wirth) [USNM]

## DIAGNOSIS AND KEY TO SPECIES

### MALES

1. *General*: Wing vein  $R_5$  branching off from  $R_4$  at near or greater than a  $45^\circ$  angle (Fig. 2). *Genitalia*: Apex of dorsal dististyle lobe broadly rounded ..... 2
- General*: Wing veins  $R_4$  and  $R_5$  forming a symmetrical fork from petiole

<sup>2</sup>Material which has come to hand since this manuscript was submitted indicates strongly, though not conclusively, that this is the larva of *Agathon elegantulus* von Röder, 1890.



- ( $R_4 + 5$ ) (Figs. 4, 6). *Genitalia*: Apex of dorsal dististyle bifurcate or attenuate ..... 3
2. *General*: Basal half of wing infuscated. *Genitalia*: Dorsal lobe of dististyle small, not extending beyond posterior margin of ventral lobe .... *yosemite*  
*General*: Wing membrane entirely hyaline. *Genitalia*: Dorsal lobe of outer dististyle large, extending well beyond posterior margin of ventral lobe ....  
 ..... *jacinto*
3. *General*: Larger species, wing length 9.0 mm. Scutellum with patches of bristles restricted to lateral corners. Fore tibia 1.5 length of basitarsus. *Genitalia*: Dorsal lobe of outer dististyle undivided, attenuate, with numerous normal bristles concentrated at the tip. .... *vanduzeei*  
*General*: Smaller species, wing length 6.7 mm. Scutellum with short bristles all along posterior border, connecting the patches at the lateral corners. Fore tibia 1.9 length of basitarsus. *Genitalia*: Dorsal lobe of outer dististyle bifurcate, posterior fork tipped with two large bristles, anterior fork with two spiniforms ..... *californicus*

## FEMALES

1. *General*: Wing vein  $R_5$  branching off from  $R_4$  at near or greater than a  $45^\circ$  angle (Fig. 1) ..... 2  
*General*: Wing veins  $R_4$  and  $R_5$  forming a symmetrical fork from petiole ( $R_4 + 5$ ) (Figs. 3, 5) ..... 3
2. *General*: No characters presently known. *Genitalia*: Oviscapt tapering caudad; only two setae arising from small sclerite immediately caudad of oviscapt; small lobe laterad of oviscapt devoid of setae ..... *yosemite*  
*General*: No characters presently known. *Genitalia*: Oviscapt roughly quadrangular in outline, lateral borders parallel; four setae arising from small sclerite immediately caudad of oviscapt; setae present on small lobe laterad of oviscapt ..... *jacinto*
3. *General*: Scutellum with patches of short bristles restricted to lateral corners. *Genitalia*: Spermatheca elongate ovoid ..... *vanduzeei*  
*General*: Scutellum with short bristles all along posterior border, connecting the patches at the lateral corners. *Genitalia*: Spermatheca pear-shaped ....  
 ..... *californicus*

## MATURE LARVAE

(*jacinto* and *vanduzeei* unknown)

(See also Table 1)

1. Dorsal sclerotized process in the form of tubercles. Lateral gill filaments 5 in number ..... 2  
 Dorsal sclerotized processes in the form of transverse plates. Lateral gill filaments 3 in number ..... *californicus*

2. Lateral sclerotized processes divided into dorsal and ventral subequal, apically swollen lobes ..... *yosemite*  
 Lateral sclerotized processes undivided .....  
 ..... UNIDENTIFIED LARVA FROM MODOC CO.

### PUPAE

(*jacinto* and *vanduzeei* unknown)

1. Respiratory lamellae large, convoluted, the two median ones entire. Dorsal integumentary granules large and dense. Median leg case of female shorter than adjoining ones ..... *yosemite*  
 Respiratory lamellae small, flat, the two median ones deeply incised. Dorsal integumentary granules small, sparse. All leg cases of equal length in both sexes. .... *californicus*

### LITERATURE CITED

Gibo, D. L.

1964. Notes on the biology of *Blepharocera micheneri* and *Phylorus yosemite* (Diptera: Blepharoceridae) in southern California. Bull. So. Calif. Acad. Sci., 63:44-53.

Kellogg, V. L.

1903. The re-discovery of *Phylorus (Blepharocera) yosemite* Osten-Sacken. Psyche, 10:186-7.

Kitakami, S.

1931. The Blepharoceridae of Japan. Memoirs Coll. Science, Kyoto Imperial University, Ser. B., 6:53-108 + 7 pl.

Peterson, A.

1951. Larvae of insects Part II. Columbus, Ohio: pub. by author. 416 pp.

Stuckenberg, B. R.

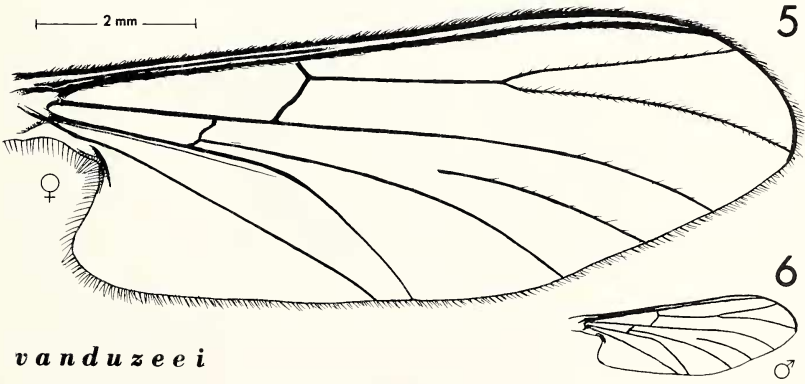
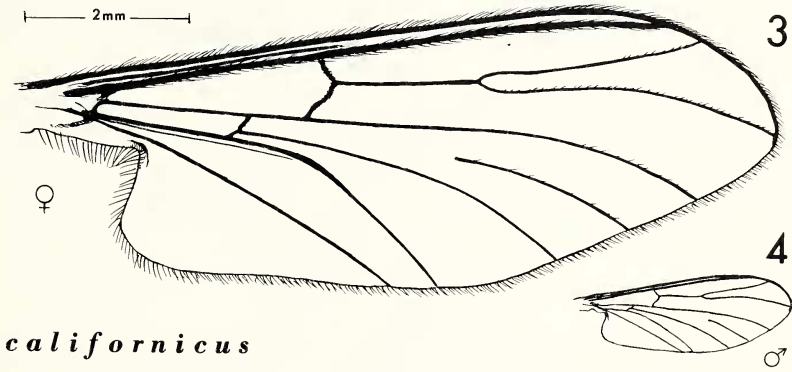
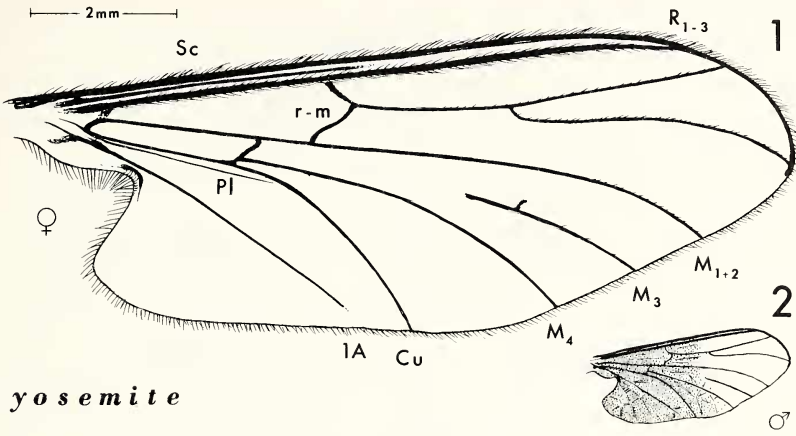
1958. Taxonomic and morphological studies on the genus *Paulianina* Alexander (Diptera: Blepharoceridae). Memoires de L'Institut Scientifique de Madagascar, Ser. E., 10:97-198.

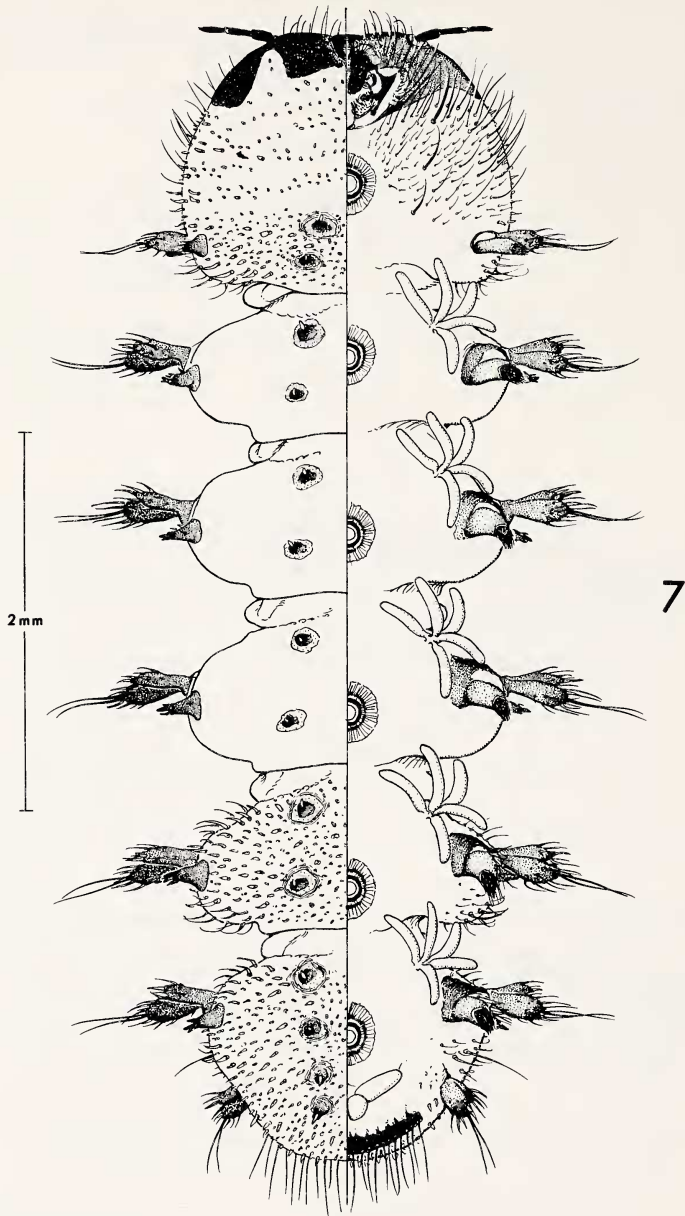
Tonnoir, A. L.

1930. Notes on Indian blepharocerid larvae and pupae with remarks on the morphology of blepharocerid larvae and pupae in general. Rec. Indian Mus., 32:161-214.

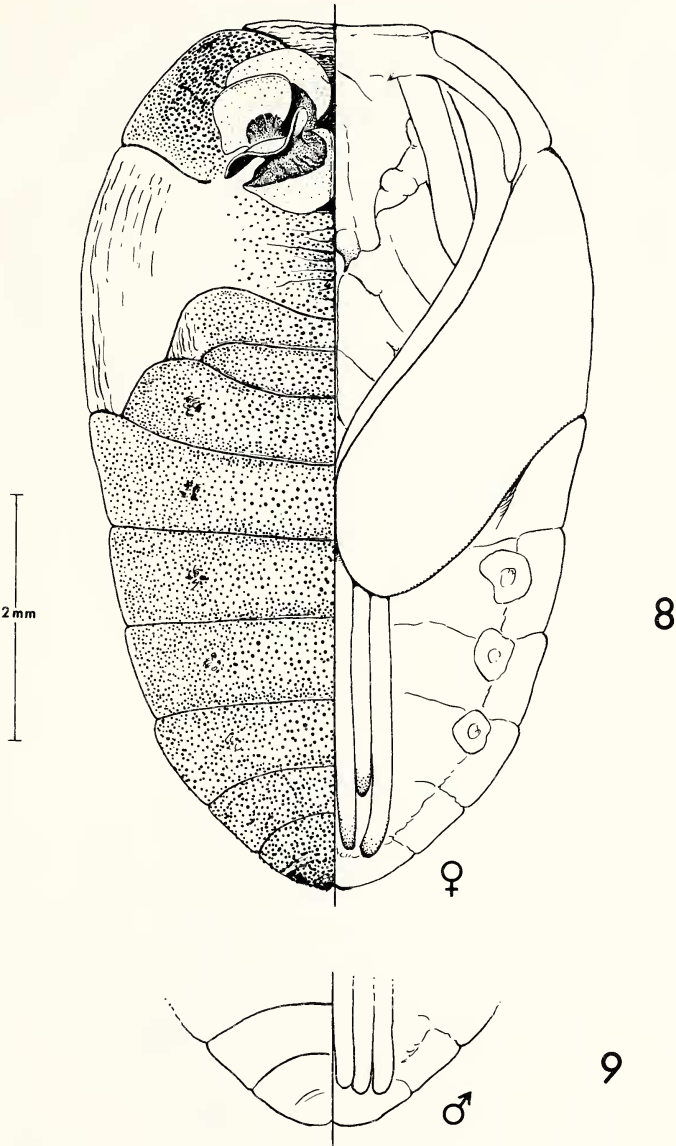
Walley, G. S.

1927. Review of the Canadian species of the dipterous family Blephariceridae. Can. Ent., 59:112-116.

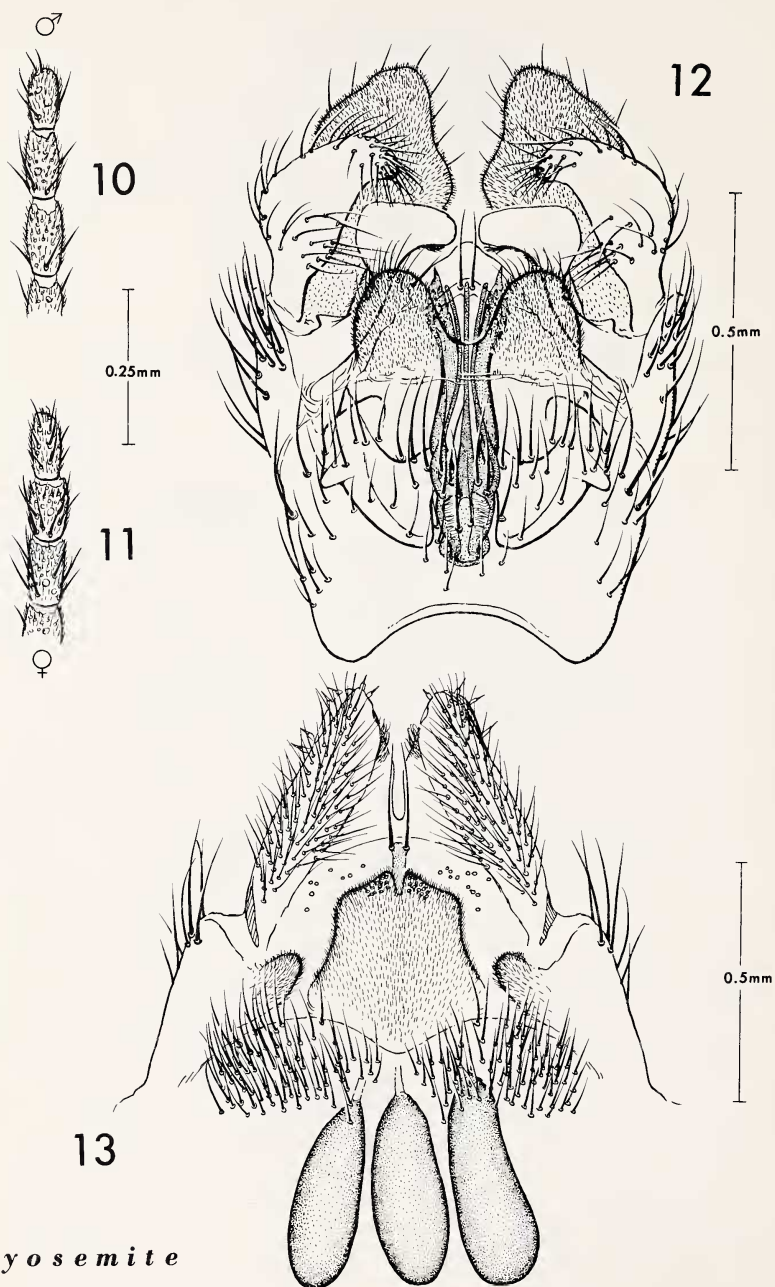




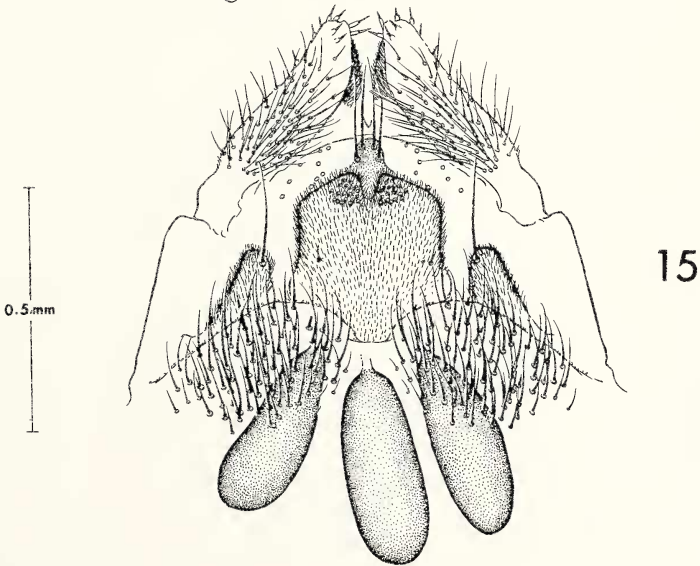
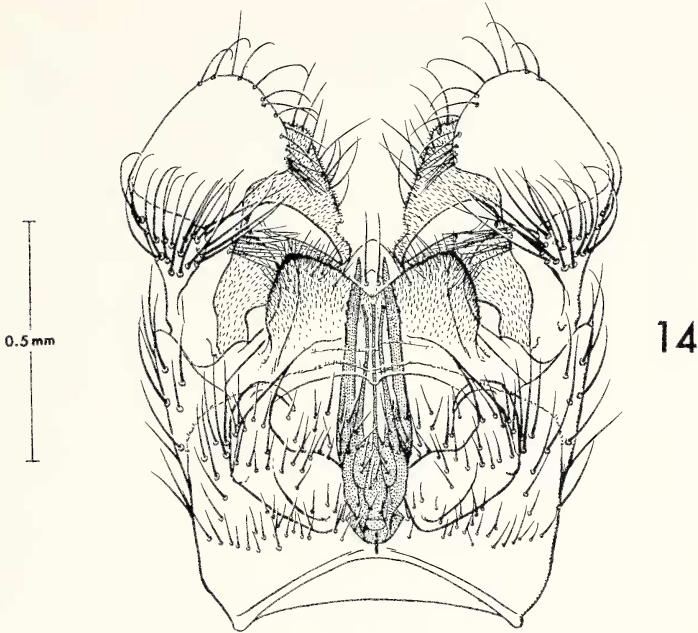
*yosemite*



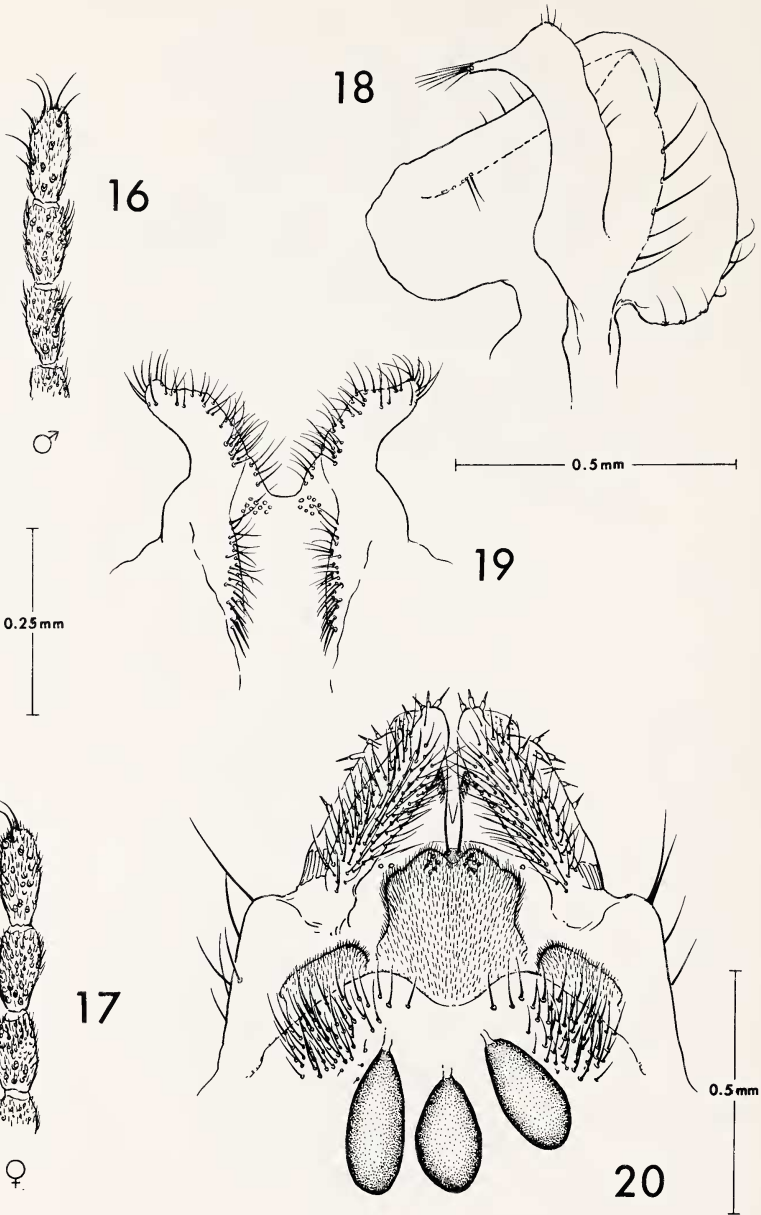
*y o s e m i t e*



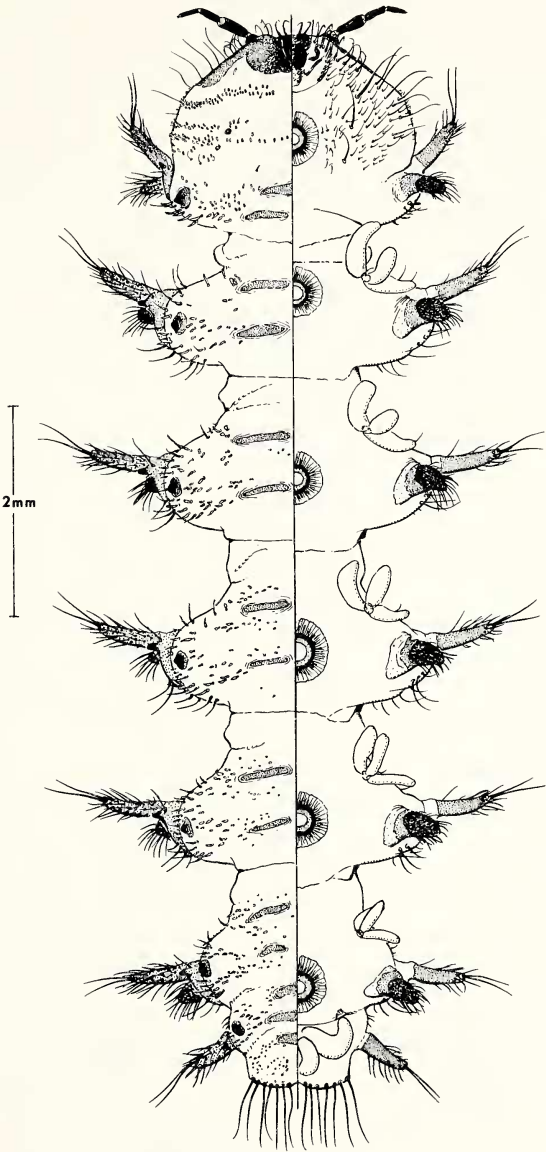




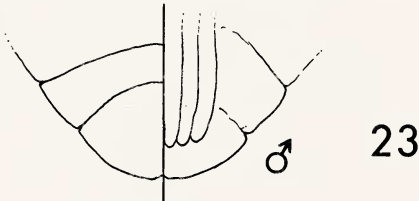
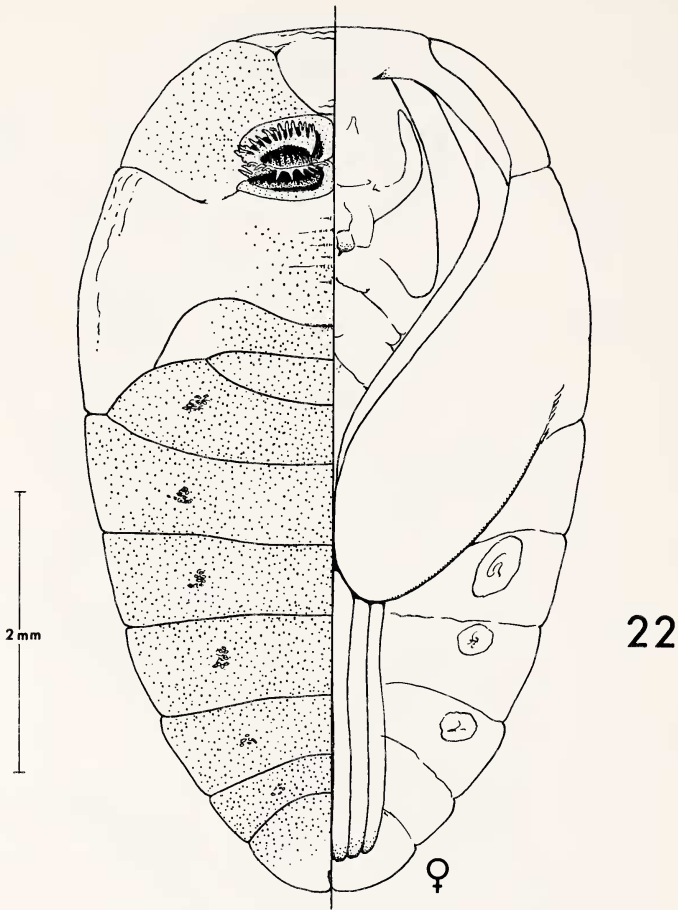
*jacinto*



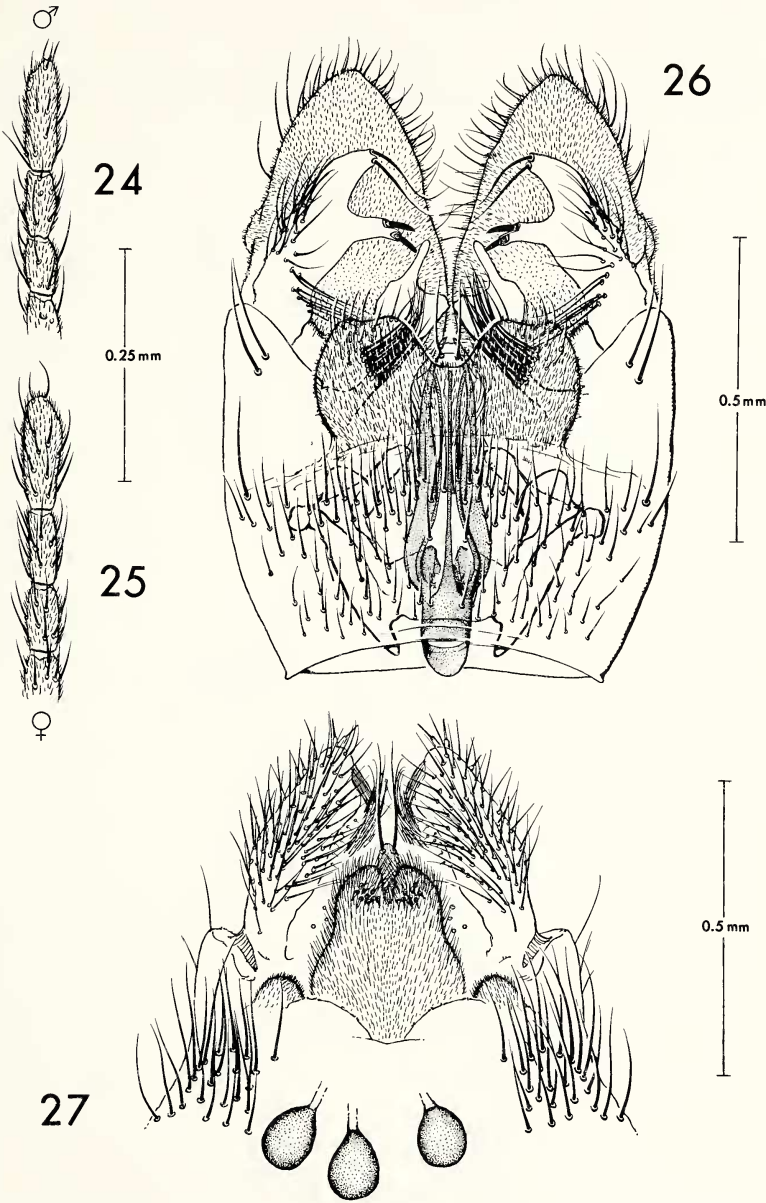
*vanduzeei*



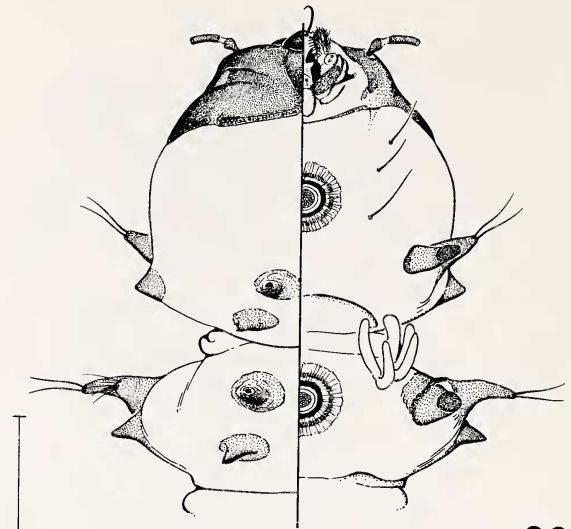
*californicus*



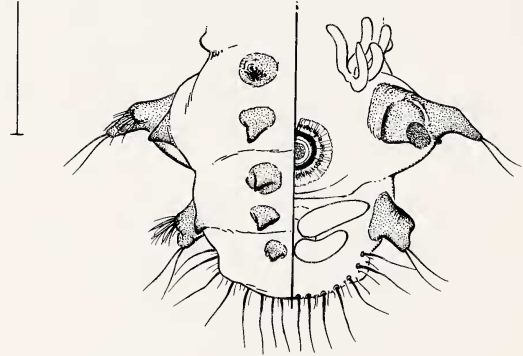
*californicus*



*californicus*



28



29

*Modoc Co. sp.*